

An Investigation into the Effects of Vacations on the Health Status in Male White-collar Workers

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Abstract

There are many stress factors in occupational settings, and the lack of vacations could be one of factors in the context of work stress. The authors have been studying the relationship between workload and employee health. This time, an investigation into the effects of leisure vacations on worker health status using male white-collar employees aged 20-60 years engaged in a manufacturing company was conducted. The subjects were questioned on work stress factors including vacations and modifiers in their occupational settings, and on psychological and physiological stress reactions; that is, how often they were able to take leisure vacations every year, their average working hours a day and work stress factors from the Demand-Control-Support model. The questions also examined other factors concerning the employees such as type-A behavior and lifestyles as modifiers, diseases of the employees, physical complaints, feelings about sleep, perceived stress, job and life satisfaction, and stress reactions as measured by physiological examination. Correlation and logistic regression analysis were conducted with the 551 eligible subjects. The results were as follows: Leisure vacation was decreasingly related to some of psychological stress reactions after adjustment was made for working hours and for modifiers. Less vacation was increasingly related to the workers' diseases especially among the employees aged 20-34, though the association was not statistically significant. Vacations did not show obvious association with physiological measures. These findings demonstrate the effectiveness and possibility of leisure vacation in controlling fatigue and maintaining the health of workers. Vacation should always be taken into consideration as a stress factor in a survey of the health problems of white-collar workers.

Key words: Vacation, Leisure, Stress, Working hours, Lifestyle

Introduction

The health status of workers is closely related to work environment and work conditions. To prevent workers from developing health defects, it is necessary to further explore the kind of stress that occurs in relation to work conditions and the magnitude of the effect of the stress. On the other hand, worker health is influenced not only by work conditions but also by rest and recuperation, a necessary condition for health recovery, and by leisure time which guarantees rest for workers. The absence of leisure time could be a stress factor. This has been recognized in the context of labor science and industrial fatigue¹⁻³⁾ in Japan.

Linn⁴⁾ and Whippen⁵⁾ also indicate that the absence of vacation was associated with stress reactions such as burnout. Therefore, when worker health is discussed, rest and leisure should also be taken into consideration.

The authors⁶⁻⁹⁾ have been studying the relationship between work conditions or workload and physical and mental stress reactions using white-collar workers for a number of years. Psychological work stress, lifestyle and type-A behavior have mainly been examined in relation to worker health. Working hours were also another factor to be considered. Working hours in Japan are said to be especially long¹⁰⁻¹²⁾ in comparison with those in America and the European nations. Long working hours in Japan have significant effects on worker health, and *karoshi*^{13,14)}, death from overwork, is one of its extreme results. Long working hours are also recognized as a social problem^{10,15,16)}, and government agencies, enterprises and labor unions have discussed it as a problem related to the wealth and welfare of worker life. Long working hours harm worker health and this contributes to improper rest. In spite of possible effects of leisure time or

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vacation on worker health, they have been out of consideration in our surveys. In this study, the authors have tried to investigate the effects of leisure vacation on worker health in the context of work stress.

Rest is realized through vacation or free time, but it is not necessarily ensured. Masugata¹⁷⁾ defines leisure time as follows: the part of free time which is utilized for leisure activity apart from working and the required time for work preparation. She also states that "leisure is the whole of voluntarily taken activity for the purposes of rest, amusement and self-enlargement," citing Dumazedier's¹⁸⁾ definition. This definition is qualitative rather than quantitative, and it is difficult to translate into survey items. But using this definition, the health effects of rest can be evaluated. In the case of assessing rest, quantitative measurement is preferable, but the following problems have to be considered: It has been pointed out that in Japan workers take a fewer number of paid holidays¹⁹⁾ than given by the employer, and they often take holidays for the purpose of medical care or ceremonial occasions. Furthermore, there are many situations¹⁹⁾ in which vacation time taken by workers cannot be evaluated as such, for example, when workers take vacations for business purposes or when they work at home. This means that vacations or the number of holidays taken may be a poor indicator of rest. Therefore, it is important to determine if the workers truly take vacations for leisure or rest, and if that is the case, qualitative assessment would be considered valid. Through the consideration above, the effects of vacation as leisure, based on the definition of Masugata, on worker health was investigated as one of the stress factors in the context of work stress. The following are the purposes of this analysis: Is vacation as leisure associated with worker health? If it is, what aspect of health does vacation affect? Does vacation independently affect worker health after adjustment is made for other stress-related factors in the work environment or conditions?

Subjects and Methods

1. Subjects and survey methods

The subjects were white-collar workers engaged in the steel industry. The total number of full-time employees is about 15,000 and the workplaces of the company are located in different districts. The subjects in this particular survey work in an office building which is located in the downtown Kinki district, Japan. In July and August 1995, the survey was performed with all of the employees in the office, 566 males and 197 females, and they were engaged in managerial, clerical or engineering work. All of the male employees had been employed by the company for at least one year or more.

The methods of the survey were as follows: work stress factors including leisure vacation, stress reactions and modifiers in the workplace were examined using self-reported questionnaires designed and prepared by the authors in July 1995. The questionnaires were collected at the time of the annual medical checkup in August. Physiological measures were also used as indicating some stress reactions when evaluating the health status of the subjects, and the results of the annual medical checkup were utilized.

2. Items investigated

1) Stress factors in the work environment

Leisure vacation, working hours and work stress factors from

the Demand-Control-Support model consist of work stress factors.

A question was given about employee vacation opportunities within the past year, which enabled the subjects to do what they could not usually do, using annual holidays with pay, flextime and so on. The response categories were: two times or more, once, or none a year. The question whether a subject could take vacations for the purpose of leisure or rest was asked, but not the number of holidays taken.

Average working hours a day were measured in terms of unit hours. The response categories were: 8, 9, 10, and 11 hours or more.

Various kinds of psychological work stress models have been proposed^{20,21)}, and the Demand-Control-Support model^{20,22)} was adopted in this survey. This was developed based on the Karasek's Demand-Control model²³⁾ and is composed of job demand, decision latitude and social support in occupational settings. Fletcher²⁴⁾ and Muntaner²⁵⁾ reported the usefulness of the model for estimating the psychosocial dimensions of work stress in relation to worker health. The following items were scored based on the answers of the subjects: strongly agree, agree, disagree, strongly disagree. Job demand: 1) My work is hectic. 2) My job is psychologically demanding. Decision latitude: 1) My work requires that I learn new things. 2) My work requires a high level of skill. 3) I can choose how to perform my own work. 4) My work is not repetitious. 5) I have influence over how my time is used at work. Social support: 1) The people I work with are friendly or helpful. 2) My supervisor is concerned about the welfare or health of workers under him.

2) Modifiers

Type-A behavior and lifestyle are modifiers in association with health.

Type-A behavior²⁶⁾ is known to be a risk factor for coronary heart disease^{26,27)} and is also considered to be an important personal factor^{9,28)} for the stressor-stress reaction relations. It has recently been indicated that type-A behavior is associated with diseases other than coronary heart disease^{28,29)} and is thought to be a necessary factor when investigating psychological work stress. Seven items below were used as questions in accordance with those chosen and modified by Munakata³⁰⁾, which had been derived from those of Friedman and Rosenman³¹⁾. According to the same answers as those of the psychological stress factors the following items were scored: 1) I am apt to hurry when talking. 2) I frequently feel like hurrying a slow speaker along. 3) I've often been told I eat too fast. 4) I do two things at once whenever practical. 5) I often feel hesitant to take a vacation. 6) I feel irritated when someone does slowly what I do fast. 7) I feel irritated when standing in a line or waiting at a busy intersection.

Lifestyle is another modifier. Breslow³²⁾ and Morimoto^{33,34)} have proved that ways of living or health practices have strong associations with health status. The presence of habitual physical exercise (once a week or more, 2 or 3 times a month, rarely), smoking (present, quit, never) and drinking habits (once a day, sometimes, none), hours of sleep (7 or 8 hours, 9 hours or more, 6 hours or less), consideration of nutritional balance (every time, sometimes, none) and the frequency of the daily eating of breakfast (daily, sometimes, none) were questioned. If subjects responded to the first category, one was given and zero if the other.

3) Stress reactions

It is said that stress reactions²¹⁾ consist of psychological and

physiological responses, and the following items were adopted as stress reactions: The presence of diseases under medical care at the time of the survey. Obesity measured by BMI (body mass index), blood pressure, serum total cholesterol and casual blood sugar were the indicators for evaluating the physiological health status. Serum cholesterol and blood sugar were not available for those employees who were 34 years of age or younger because no measurement was done in the annual medical checkup. Also, the presence of 48 subjective physical complaints in the previous month, feelings about sleep, perceived stress, job satisfaction and life satisfaction were the indicators of psychological status. Whether he or she is satisfied with his or her own job or life was questioned as the job and life satisfaction items.

3. Analysis methods

Five hundred and fifty one males aged 20-60 years out of a total of 566 male employees were eligible for the analysis below. Six male employees were over 60 years of age. One male employee who refused to answer the questionnaire and eight subjects whose questionnaires were inappropriate for analysis because of missing values were excluded. Along with the stress factors and the modifiers, the total points of job demand, decision latitude, social support, type-A behavior and lifestyle were calculated according to the Likert scale³⁵⁾. After this calculation, all response categories of the scales were dichotomized into two categories according to their meanings or the points which were the nearest to 50% of their cumulative frequency distributions. The response categories reconstructed are as follows: Working hours (less than 10 hours, 10 hours or more), job demand, decision latitude and social support (high, low), type-A behavior (type-A, type-B), lifestyle (good, bad), physical complaints (none or one, two or more), feelings about sleep (having problems, nonexistent), perceived stress (having, not having), job and life satisfaction (yes, no). The response categories for physiological measures were as follows: The presence of diseases (having, not having), obesity (BMI < 24, 24 or more), blood pressure (diagnosed hypertension or diastolic blood pressure > 90 mmHg or systolic blood pressure > 140 mmHg, other), serum total cholesterol (diagnosed hypercholesterolemia or serum cholesterol > 220 mg/dl, other) and casual blood sugar (diagnosed diabetes mellitus or casual blood sugar > 110mg/dl, other).

All data gathered were registered into a personal computer system. After entering this data to examine the relationship between vacation time and other stress-related factors, the following analyses were conducted using the software, SAS(Release 6.08)³⁶⁾: 1) The percentages of either category of each variable investigated in every vacation category by age group were calculated. Each contingency table was tested using the chi-squared test. 2) The Cochran-Mantel-Haenszel test^{36,37)} was applied to evaluate the relationship between vacation and stress reactions adjusted for the possible confounding stress factors extracted from the previous analysis at the level of $p < 0.05$ and modifiers. 3) With the statistically significant combinations of vacation and stress reactions found in the previous analysis, to estimate the independent effects of vacation on stress reactions, the multiple logistic regression analysis using a PROC LOGISTIC procedure in SAS was conducted after adjustment was made for the same possible confounding factors above. The adjusted odds ratios and 95% confidence intervals of each vacation category, once and none a year, to the reference category, twice or more, were calculated. Also, the dose-response relationship between

vacation and stress reactions were tested for trend using the logistic regression model where vacation was included as a continuous variable. The values for vacation were assigned as follows: zero if twice or more, one if once and two if none of vacations. Model fit^{36,37)} was assessed by the -2 Log Likelihood statistic.

After considering age distribution, the job advancement system in the company and the difference of test items in the annual medical checkup, the age groups were divided into three categories; 20-34, 35-44 and 45-60 years of age.

Results

1. Vacations taken by the subjects (Table 1)

The percentage of those who took leisure vacations two times or more within the previous year was 54.1% for all of the subjects analyzed. The percentage of those who took one vacation was 30.9%, and for those who did not take any vacation it was 15.1%. The percentage of those who took vacations two times or more a year was the highest in the 20-34 age group (64.5%) and the lowest in the 35-44 age group (42.9%).

2. Association between vacation and stress factors and modifiers (Table 2)

Vacation was significantly associated with working hours in the 20-34, 35-44 and 45-60 age groups ($p < 0.05$) and the all subjects group ($p < 0.001$). There was a tendency for an association between those who took fewer vacations and those who worked ten or more hours a day. For those who took no vacation, the percentages of high job demand were the highest in all the age groups, and in the all subjects group this relationship was statistically significant ($p < 0.05$). The same associations were found between vacation and decision latitude except with the 20-34 age group. The association between leisure vacations and social support did not show a consistent tendency for any age groups.

The percentages of those who possessed type-A behavior were the highest in those who took no vacation in the 35-44 and 45-60 age groups and in the all subjects group ($p < 0.05$). The percentage of those who had a bad lifestyle was the lowest in those who took no vacations in the 20-34 age group though the converse tendencies were found in the 35-44 ($p < 0.05$) and 45-60 age groups. On an average, the younger groups showed higher percentages of a bad lifestyle than the older. In the all subjects group, the percentage of those who had a bad lifestyle increased along with the decrease of vacations taken though this association was not significant.

3. The relationship between vacation and stress reactions (Table 2)

The fewer vacations the subjects took, the more the percentage of those who had diseases increased in the 20-34 age group, though this was not significant. The converse association was found in the 35-44 age group. For those who took vacations twice or more a year, the percentages of those who showed abnormal physiological responses were the lowest except for body mass index in the 45-60 age group, though these relationships were not significant. Those who took no vacations indicated the highest percentages of physical complaints in all age groups. The percentages of those who had some sleep problems were also the highest in those who took no vacations in all age groups, and this relationship was significant in the 20-34 and in the all subjects

group ($p < 0.01$). The percentages of those who had perceived stress were the highest in those who took no vacations, and in the all subjects group this relationship was statistically significant ($p < 0.05$). The same tendency was found in the associations between vacation and job satisfaction though none of the associations were significant. The percentages of those who were not satisfied with their lives decreased along with the frequency of vacations taken ($p < 0.01$) except in the 45-60 age group. Even in the 45-60 age group, the percentage of those who were not satisfied with their lives was the lowest for those who took two or more vacations a year.

4. The relationship between vacation and stress reactions adjusted for possible confounding factors (Table 3)

The relationship between vacation and stress reactions adjusted for working hours and modifiers was examined using the Cochran-Mantel-Haenszel test. Vacation did not show any significant association with diseases or physiological measures.

Table 1. Vacations taken within the last one year and the number of the subjects analyzed.

Age group		The number of times of vacations taken			Total
		Twice or more	Once	None	
20-34 yr	n	120	42	24	186
	%	64.5	22.6	12.7	
35-44 yr	n	69	60	32	161
	%	42.9	37.3	19.9	
45-60 yr	n	109	68	27	204
	%	53.4	33.3	13.2	
All subjects	n	298	170	83	551
	%	54.1	30.9	15.1	

The summation of the percentages is not 100 because of rounding off.

Vacation was significantly associated with feelings about sleep ($p < 0.01$), job ($p < 0.05$) and life satisfaction ($p < 0.01$) in the 20-34 age group. In spite of there being no statistical significance in the previous analysis, vacation was significantly related to job satisfaction. The relationship of vacation and life satisfaction was also significant ($p < 0.05$) in the 35-44 age group. Vacation was significantly associated with feelings about sleep ($p < 0.001$), job ($p < 0.05$) and life satisfaction ($p < 0.001$) in the all subjects group. The association between vacation and perceived stress was not significant in spite of statistical significance in the previous analysis.

5. Independent effects of vacation on stress reactions (Table 4)

In the 20-34 age group, the odds ratios between vacation and feelings about sleep were larger than one and statistically significant ($p < 0.05$). The odds ratio of once a year was higher than that of none, though the logistic regression coefficient of vacation for trend, where vacation was included as a continuous variable, was statistically significant ($p < 0.01$). In job and life satisfaction, the odds ratios increased along with the decrease of vacations taken in the 20-34 age group. Though the odds ratios were not significant except for that of none in life satisfaction, the logistic regression coefficients were statistically significant together ($p < 0.05$ and $p < 0.01$ respectively). In the 35-44 age group, the odds ratios in life satisfaction increased along with the decrease of vacations taken, and the logistic regression coefficient was significant ($p < 0.05$). In the all subjects group, the odds ratios in feelings about sleep, job and life satisfaction after adjustment was made for working hours, lifestyle, type-A behavior and age group increased along with the decrease of vacation, and the logistic regression coefficients were statistically significant ($p < 0.01$, $p < 0.05$ and $p < 0.001$). All the -2 Log Likelihood statistics were significant ($p < 0.05$) though the results were not indicated in the table.

Table 2 The percentages of the response categories of stress-related factors investigated, by age group and vacation category. (%)

Items	Response	20-34 yr (n=186)				35-44 yr (n=161)				45-60 yr (n=204)				All subjects (n=551)			
		2≤	Once	None		2≤	Once	None		2≤	Once	None		2≤	Once	None	
Stressors:																	
Working hours	(10hr≤)	45.8	69.1	66.7	*	39.1	50.0	68.8	*	25.7	42.7	48.2	*	36.9	51.8	61.5	***
Job demand	(high)	61.7	57.1	66.7	ns	52.2	58.3	75.0	ns	38.5	50.0	55.6	ns	51.0	54.7	66.3	*
Decision latitude	(low)	20.8	33.3	25.0	ns	29.0	30.0	50.0	ns	30.3	33.8	48.2	ns	26.2	32.4	42.2	*
Social support	(low)	22.5	26.2	41.7	ns	21.7	26.7	18.8	ns	32.1	30.9	25.9	ns	25.8	28.2	27.7	ns
Modifiers:																	
Type-A behavior	(Type-A)	55.8	38.1	54.2	ns	59.4	50.0	68.8	ns	53.2	57.4	77.8	ns	55.7	50.0	67.5	*
Lifestyle	(bad)	60.8	66.7	54.2	ns	33.3	53.3	62.5	*	37.6	48.5	51.9	ns	46.0	54.7	56.6	ns
Stress reactions:																	
Diseases	(having)	3.3	7.1	12.5	ns	15.9	13.3	6.3	ns	20.2	11.8	22.2	ns	12.4	11.2	13.3	ns
Body mass index	(24≤)	21.7	23.8	29.2	ns	34.8	40.7	37.5	ns	36.5	30.9	53.9	ns	30.1	32.5	40.2	ns
Blood pressure	(high)§	8.3	9.5	12.5	ns	20.3	24.1	21.9	ns	38.0	38.2	42.3	ns	21.9	26.2	25.6	ns
Serum cholesterol ‡	(high)§	-	-	-		23.2	25.9	31.3	ns	32.7	42.7	42.3	ns	<u>29.0</u>	<u>34.9</u>	<u>36.2</u>	ns
Casual blood sugar ‡	(high)§	-	-	-		2.9	3.5	3.1	ns	9.4	10.3	15.4	ns	<u>6.8</u>	<u>7.1</u>	<u>8.6</u>	ns
Physical complaints	(2 or more)	32.5	26.2	50.0	ns	23.2	38.3	40.6	ns	36.7	38.2	48.2	ns	31.9	35.3	45.8	ns
Fellings about sleep	(bad)	22.5	21.4	58.3	**	21.7	28.3	37.5	ns	30.3	29.4	40.7	ns	25.2	27.1	44.6	**
Perceived stress	(yes)	61.7	59.5	83.3	ns	43.5	48.3	56.3	ns	36.7	45.6	55.6	ns	48.3	50.0	63.9	*
Job satisfaction	(no)	30.8	41.5	45.8	ns	18.8	25.0	34.4	ns	22.0	25.0	26.9	ns	24.8	29.0	35.4	ns
Life satisfaction	(no)	40.3	51.2	75.0	**	14.5	36.2	40.6	**	17.4	30.9	25.0	ns	25.9	37.7	46.3	**

The chi-squared test is utilized to check the statistical significance of independence between factors.

ns : not significant, * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$

† These checkup items are not undertaken for those who are 34 years of age or younger, and see methods.

§ See methods in text for the categories.

Table 3 The relationship between vacation and stress reactions: The Mantel-Haenszel statistics and statistical significance adjusted for working hours, lifestyle and type-A behavior.

Items	20-34 yr (n=186)		35-44 yr (n=161)		45-60 yr (n=204)		All subjects # (n=551)	
Diseases	2.66	ns	2.03	ns	2.03	ns	0.05	ns
Body mass index	1.93	ns	0.21	ns	1.63	ns	3.19	ns
Blood pressure	0.04	ns	0.06	ns	0.49	ns	0.45	ns
Serum cholesterol ¶	- §		0.04	ns	2.16	ns	1.57	ns
Casual blood sugar¶	- §		0.96	ns	0.85	ns	1.56	ns
Physical complaints	0.90	ns	1.17	ns	0.95	ns	2.98	ns
Feelings about sleep	9.96	**	3.32	ns	0.83	ns	11.23	***
Perceived stress	1.85	ns	0.03	ns	0.80	ns	1.52	ns
Job satisfaction	4.04	*	2.18	ns	0.07	ns	4.77	*
Life satisfaction	8.13	**	6.30	*	1.34	ns	14.51	***

ns : not significant, * : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$

The Mantel-Haenszel statistics are adjusted for working hours, lifestyle, type-A behavior and age group, and the chi-squared test (df=1) gives statistical significance.

¶ These checkup items are not undertaken for those who are 34 years of age or younger.

§ Serum cholesterol and casual blood sugar are not measured, and see methods in text.

Table 4 Independent effects of vacation on stress reactions: Odds ratios of vacation adjsuted for working hours, lifestyle and type-A behavior.

Items	Vacation	20-34 yr (n=186)			35-44 yr (n=161)			All subjects # (n=551)	
		OR	95%CI		OR	95%CI		OR	95%CI
Feelings about sleep (bad)	once	6.40	2.05 - 20.01	**				2.22	1.27 - 3.87
	none	5.66	2.15 - 14.86					2.44	1.45 - 4.10
Job satisfaction (no)	once	1.09	0.38 - 3.11	*				1.27	0.72 - 2.25
	none	2.30	0.91 - 5.81					1.80	1.05 - 3.10
Life satisfaction (no)	once	2.88	0.93 - 8.86	**	0.93	0.37 - 2.35	*	1.23	0.70 - 2.16
	none	4.15	1.52 - 11.35		3.25	1.17 - 9.04		2.35	1.37 - 4.03

The odds ratios are calculated using the multiple logistic regression equation below.

$$\text{logit } P = b_0 + b_1 \cdot (\text{working hours}) + b_2 \cdot (\text{lifestyle}) + b_3 \cdot (\text{type-A behavior}) + b_4 \cdot (\text{vacation1}) + b_5 \cdot (\text{vacation2})$$

(vacation1 and vacation2 are dummy variables, and indicate once and none of vacation respectively.)

The logistic regression coefficients of vacation, 0 if twice or more, 1 if once and 2 if none, are calculated using the equation below, and the statistical significance resulting from the Wald chi-squared test is indicated.

$$\text{logit } P = b_0 + b_1 \cdot (\text{working hours}) + b_2 \cdot (\text{lifestyle}) + b_3 \cdot (\text{type-A behavior}) + b_4 \cdot (\text{vacation})$$

* : $p < 0.05$, ** : $p < 0.01$, *** : $p < 0.001$

OR : odds ratio (the reference category is twice or more), 95%CI : 95% confidence interval

Odds ratios are adjusted for working hours, lifestyle, type-A behavior and age group.

Discussion

Japanese workers are given annual holidays³⁸⁾ legally or through collective agreement. The number of annual holidays given to the employees engaged in this company was 117 days per year and no other days off were allowed in 1995 such as waiting for a recall at home during a temporary company layoff. This number includes the 52 weekends of the year and the national holidays. Also some holidays are given with or without pay, such as holidays for volunteer activity, child-rearing and so on. Japanese workers have three chances for long vacations every year in connection with social customs: The New Year's holidays, so-called Golden Week, which is a concentration of national holidays from the end of April to the beginning of May, and summer vacation in the middle of August. Vacations prescribed by collective agreement are usually set up during these occasions and workers take advantage of them. As shown in Table 1, more than half of the subjects could take substantial vacations two times or more within a one year period, but about 15% of the subjects had the possibility of suffering from stress due to the lack of vacations. This percentage seems to be large in

consideration of the number of holidays for these subjects. Vacation is a qualitative measure question in this survey, and no vacation does not necessarily mean no holidays. But the recent restructuring movement in the company surveyed has also to be taken into consideration in interpreting the meaning of no vacations. The recent Japanese economical recession¹⁰⁾ is forcing enterprises of the restructuring of the corporation system, and also this company is not excluded from the effects. As a result, the curtailment of employment is progressing and the volume and responsibility of work for each employee have increased. Therefore, it would not be denied that the effects of economical background in the workplace above deprive employees of leisure vacations physically and psychologically.

The mode of the relationship between vacation and other work stress factors were not consistent throughout age groups. Takeda^{39,40)} investigated the relationship between age and working situations of Japanese white-collar employees in a company and reported that age had a great influence on their working life and lifestyle. That is, the younger workers are under larger job demand and lower decision latitude and feel more fatigue than the older workers. These tendencies were found in our survey and thought to be common findings with Japanese male white-

collar workers. Also, the findings above suggest that in the surveys conducted for occupational settings in Japan it is appropriate to check the results by age groups.

In this investigation, the health effects of leisure vacation were examined in the context of work stress because lack of vacation was assumed to be one of the stress factors. Vacation was significantly related to working hours through all the age group, and was not significantly associated with psychological stress factors, though the relationship was significant in the all subjects group (Table 2). Job demand and decision latitude showed lesser association with vacation than did working hours, and the tendencies of association with vacation were not consistent throughout age groups. Also low social support did not hinder workers from taking vacations. Because the psychological work stress factors were questioned in relation to work itself, the subjects would answer only while they were at work. The psychological factors are literally the reflection of employees' subjective feelings and do not always concord with the hours worked. Though, in this survey, job demand and decision latitude were not significant and showed inconsistent association, the results here possibly suggest that they are factors to be considered in the context of work stress. On the other hand, the number of hours worked possibly prevents workers from taking vacations, even though paid holidays and vacations are institutionally guaranteed and are usually set up annually. The authors^{6,7)} conducted surveys related to working hours in this company several years ago, and the number of overtime hours each month was examined together with average working hours a day. In male subjects, the phi coefficient (ϕ) between both variables was 0.85, and average working hours a day is thought to reflect whole quantity of work to a certain extent. (This result is not reported but data are available by request from the authors.) Vacation showed significant association with working hours, but the phi coefficient between them was 0.22 and not too large. Though vacation reflects the whole quantity of work, it is thought to be appropriate that the independent effect of vacation is examined in the context of work stress apart from working hours.

Those who possessed type-A behavior tended to take fewer leisure vacations in the over 35 age groups. Some reports^{12,13,15,16,41)} which studied the issues of vacation in Japanese workers indicated that the reasons why the long vacation was not established was related to the national character or the way Japanese companies operate. But in consideration of the workaholic character of Japanese workers¹¹⁻¹³⁾ and the results here, which were not significant, type-A behavior is recommended as a factor to also be examined when considering a survey of vacation issues. There was the tendency that a healthier lifestyle was found in those who took more vacations in the 35-44 and 45-60 age groups. Chronic diseases^{42,43)} in the middle-aged or elderly people, such as hypertension or diabetes mellitus, are said to be related to lifestyle. It is therefore meaningful for workers to take vacations properly from the viewpoint of health care management. In this survey only type-A behavior and lifestyle were considered as modifiers through a references survey^{8,11-13,28,29,33)} and the results⁶⁻⁹⁾ of past investigations on this subject group. No other property, for example type of occupation was considered as a modifier. Type of occupation could probably be related to both stress factors and stress reactions as a confounding factor. But it cannot be a stress factor which is useful for preventing employees from developing health defects, and such properties were not considered.

Diseases under medical care increased along with the decrease of vacations taken in the 20-34 age group, and the fewer chances of taking vacations were associated with the longer working hours and the decrease of bad lifestyles (Table 2). An inverse tendency was found in the 35-44 age group, and the fewer vacations were decreasingly related to the frequency of employee diseases. Most of the diseases in this age group would be chronic, for example, hypertension or diabetes mellitus, and lifestyle could have greater effects than vacations taken. But the possibility of selection bias⁴⁴⁾ has to be taken into consideration also. That is, those who have no diseases worked without taking vacations, and this seems to be a better interpretation than the former. Actually those who took no vacations complained of more physical symptoms and bad feelings about sleep in the 35-44 age group, and showed a high percentage of a bad lifestyle. Therefore, low frequency of diseases in those who took no vacations for the 35-44 age group is not always inconsistent with the association found in the 20-34 age group. In the 45-60 age group, the relationship between vacation and diseases was not obvious. Those who are in this age group have high prevalence of diseases, probably chronic, and their health status would be the result of a long working life. In such subjects, it is difficult to show the causal association between work and health through cross-sectional investigation. Physiological measures showed no obvious association with vacation. Physiological measures^{34,43)} have been demonstrated to be mainly associated with age or health practices. Vacations can ensure good health practices, and directly and indirectly vacation could result in positive physiological effects.

The relationships between vacation and psychological stress reactions showed no differences among age groups, and in those who took no vacations the percentages of those items were the highest (Table 2). Most of the physical complaint items and feelings about sleep reflect the states of worker fatigue, and when workload for these subjects does not vary extremely throughout the year, vacations taken voluntarily and properly throughout the year may affect the feelings of fatigue. If leisure vacations were timely taken, vacation may decreasingly be associated with physical complaints or feelings about sleep, even when workload changes considerably. A third factor might intervene among them, for example, personality such as type-A behavior. But vacation is independently related to feelings about sleep after adjustment is made for the possible confounding factors containing type-A behavior (Table 3 and 4), and such a possibility would be unlikely. Moreover, vacation was significantly related to job and life satisfaction. Vacation showed stronger association with life satisfaction than job satisfaction (Table 2, 3 and 4). Job satisfaction⁴⁵⁻⁴⁷⁾ is reported to have a closer association with various work environments or conditions. On the other hand, intimate association of vacation with life satisfaction means that the global effects of vacation are beyond the occupational field. In Japan, there has been a proposal for the establishment of an affluent society or a substantial welfare system^{10,15,16,41)} corresponding to the country's economic status. Taking leisure vacations could play important roles in the improvement of the quality of working life.

Through the analyses, vacation assessed qualitatively was mainly related to a psychological health status as a factor in the context of work stress. Whether workers can substantially take rest with vacation is expected to affect their psychological well-being as an indicator of working life. The subjects investigated in

this survey are white-collar workers engaged in a large company, and labor management including vacation system is well-established. Also, the manufacturing industry is operated systematically and white-collars seem to work deliberately. Therefore, it is meaningful that the health effects of leisure vacations were found in the subjects here in spite of their relatively good working conditions. Based on the findings in this survey, the effects of vacation measured quantitatively on both physical and psychological worker health have to be examined in various industrial fields. The number of days or timing and frequency of vacation throughout the year have to be explored. Vacation is usually established legally or through collective

agreement and seems to be more controllable than working hours in daily working life. The authors reviewed references published within the last 10 years that had treated the issues of vacation or leisure and health, which appeared in the report from the related agency⁴⁸⁾, and found that few investigations were conducted with respect to these problems. It is important to exclude hazardous factors in the occupational settings, but vacation also has to be taken into consideration and investigated as health-related factors for workers. If an effective method for taking vacation for rest is investigated, the findings would be helpful for workers to establish a healthier working life.

References

- 1) Nozawa H. Concept of leisure and overtime work agreement in connection with consciousness of law. *J Science of Labour* 1971; **47**: 123-53.
- 2) Endo Y. Problems of working hours and daily life conditions of present-day workers in Japan. *J Science of Labour* 1986; **62**: 277-90.
- 3) Aoyama H. Significance of Industrial Fatigue Survey. In: Industrial Fatigue Research Society, Japanese Society for Occupational Health ed. *Industrial Fatigue Handbook*. Tokyo: Rodo Kijun Chosakai, 1988: 23-33. (in Japanese)
- 4) Linn LS, Yager J, Cope D, Leak B. Health status, job satisfaction, job Stress and life satisfaction among academic and clinical faculty. *JAMA* 1985; **254**: 2775-82.
- 5) Whippen DA, Canellos GP. Burnout syndrome in the practice of oncology: results of a random survey of 1,000 oncologists. *J Clin Oncol* 1991; **9**: 1916-20.
- 6) Tarumi K, Hagihara A, Morimoto K. Working hours and commuting time from the viewpoint of health care management in an occupational setting -an investigation of the effects on lifestyle-. *Jpn J Pub Health* 1992; **39**: 163-71.
- 7) Tarumi K, Hagihara A, Morimoto K. An inquiry into the relationship between job strain and blood pressure in male white-collar workers. *Jpn J Ind Health* 1993; **35**: 269-76.
- 8) Hagihara A, Tarumi K, Miller AS. Social support at work as a buffer of work stress-strain relationship: A signal detection approach. *Stress Med.* (in Press)
- 9) Hagihara A, Tarumi K, Morimoto K. Type A and Type B behaviors and factors related to job satisfaction among male white-collar workers. *Env Health Prev Med* 1998; **2**: 139-44.
- 10) Ministry of Labour. White Paper on Labour 1996. Tokyo: The Japan Institute of Labour, 1997.
- 11) Nozawa H. The present conditions of working hours and the socio-cultural background of the understanding of leisure in Japan: Part 1. Analysis from the legal socio-logical points of view. *J Science of Labour* 1987; **63** (Part II): 1-11.
- 12) Saito Y. Ergology and the problem off leisure for Japanese workers. *J Human Ergol* 1989; **18**: 1-2.
- 13) National defense counsel for victims of Karoshi. KAROSHI, When the "corporate warrior" dies. Tokyo: Mado-Sha, 1990.
- 14) Uehata T. Karoshi due to occupational stress-related cardiovascular injuries among middle-aged workers in Japan. *J of Science of Labour* 1991; **67**(1 Pt II): 20-8.
- 15) Panel discussion. Working hours and life in Japan as the Europeans see it. *Sohyo Chosa Geppo* 1987; **245**: 2-40. (in Japanese)
- 16) Nozaki K. Invitation of enforcing continuous holidays. Tokyo: Romu Gyosei Kenkyusho, 1990. (in Japanese)
- 17) Masugata T. Company Society and Leisure. Tokyo: Gakuyo Shobo, 1995: 6-14. (in Japanese)
- 18) Dumazedier J. Toward a society of leisure. London: Collier-Macmillan, 1967: 14-7.
- 19) Ministry of Labour. For enforcement of taking vacations. *Rodo Kijun* 1995; **47**: 10-3. (in Japanese)
- 20) Fletcher B. Models of Stress and Disease. In: Work, Stress, Disease and Life Expectancy. Chichester: John Wiley & Sons, 1991: 1-31.
- 21) Baker DB, Karasek RA. Occupational Stress. In: Levy BS, Wegman DH. *Occupational Health* 3rd ed. Boston: Little, Brown and Company, 1995: 381-406.
- 22) Johnson JV, Hall EM. Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *Am J Public Health* 1988; **78**: 1336-42.
- 23) Karasek RA. Job demand, job decision latitude, and mental strain: implication for job redesign. *Administr Sci Quart* 1979; **24**: 285-307.
- 24) Fletcher B, Jones F. A refutation of Karasek's demand-discretion model of occupational stress with a range of dependent measures. *J Organizat Behav* 1993; **14**: 319-30.
- 25) Muntaner C, Schoenbach C. Psychosocial work environment and health in U.S. metropolitan areas: A test of the demand-control and demand-control-support models. *Int J Health Serv* 1994; **24**: 337-53.
- 26) Feinleib M, Brand RJ, Remington R, Zyzanski SJ. Section Summary: Association of the Coronary-Prone Behavior Pattern and Coronary Heart Disease. In: Dembroski TM, Weiss SM, Shields JL, Haynes SG, Feinleib M ed. *Coronary-Prone Behavior*. New York: Springer-Verlag, 1978: 2-9.
- 27) Fletcher B. Stress and coronary heart disease. In: Fletcher B. *Work, Stress, Disease and life expectancy*. Chichester: John Wiley & Sons, 1991: 114-62.
- 28) Ivancevich JM, Matteson MT. Occupational stress, type-A behavior, and physical well being. *Academy of Management J* 1982; **25**: 373-91.
- 29) Baban A, Dumitrascu DL, Derevenco P. Analysis of psychophysiological mechanism with cardiovascular risks. *Rom J Physiol* 1993; **30**: 223-9.
- 30) Munakata T, Nakao T, Fujita K, Suwa S. Stressor, coping, and mental health in an urban population. *J Mental Health (Seishin Eisei Kenkyu)* 1985; **32**: 49-68.
- 31) Zyzanski SJ, Jenkins D. Basic dimensions within the coronary-prone behavior pattern. *J Chron Dis* 1970; **22**: 781-95.
- 32) Berkman LF, Breslow L. *Health and Ways of Living*. Oxford: Oxford University Press, 1983.
- 33) Morimoto K. *Lifestyle and health*. Tokyo: Igaku Shoin, 1993. (in Japanese)
- 34) Morimoto K. Preventive medicine in stress emergency. Tokyo: Nippon Hoso Shuppan Kyokai, 1997. (in Japanese)
- 35) Streiner DL, Norman GR. *Health measurement scales* 2nd ed. Oxford: Oxford University Press, 1995: 31-48.
- 36) SAS Institute Inc. *SAS/STAT User's Guide*. Cary: SAS Institute Inc, 1988.
- 37) Yanagawa T. Analysis of Discrete Multivariate Data. Tokyo: Kyoritsu Shuppan, 1992: 117-62. (in Japanese)
- 38) Hanami T. *Managing japanese workers*. Tokyo: The Japan Institute of Labour, 1994.
- 39) Takeda F. A comparative study of age differences of work and life among the white collar male workers I. *Japanese Journal of Health and Human Ecology (Minzoku Eisei)* 1991; **57**: 227-38.
- 40) Takeda F. A comparative study of age differences of work and life among the white collar male workers II. *Japanese Journal of Health and Human Ecology (Minzoku Eisei)* 1991; **57**: 239-52.
- 41) Kato J. To actualize the shorten work hours through constructing leisure culture. *Economist* 1986; **64**: 28-33. (in Japanese)
- 42) Gross F, Strasser T. *Mild Hypertension: Recent advances*. New York: Raven Press, 1983.

- 43) Report of the U.S. Preventive Services Task Force. Guide to Clinical Preventive Services. New York: Williams & Wilkins, 1989.
- 44) Last JM. A Dictionary of epidemiology. Oxford: Oxford University Press, 1984.
- 45) Maruyama S, Sato H, Morimoto K. Relationship between worklife satisfaction, health practices and primary symptom/problems. Jpn J Hyg 1991; 45: 1082-94.
- 46) Sundstrom E, Sundstrom MG. Workplaces -The Psychology of the Physical Environment in Offices and Factories. Niigata: Nishimura Shoten, 1992: 77-86. (Japanese translation)
- 47) Tao M. Organizational Psychology. Tokyo: Yuhikaku, 1994: 33-48. (in Japanese)
- 48) Leisure Development Center. Investigation with Style and Needs of Long Vacations. Tokyo: Leisure Development Center, 1997: 33-51. (in Japanese)

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